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Neotoma goldmani.

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Neotoma goldmani Merriam, 1903

Goldman's Woodrat

Neotoma goldmani Merriam, 1903:48. Type locality "Saltillo, Coahuila, Mexico."

CONTEXT AND CONTENT. Order Rodentia, Suborder Sciurognathi, Family Muridae, Subfamily Sigmodontinae, Genus *Neotoma*, Subgenus *Neotoma*. *Neotoma goldmani* is a monotypic species (Musser and Carleton, 1993).

DIAGNOSIS. *Neotoma goldmani* is the smallest known member of the genus *Neotoma*. It resembles *N. lepida* in external measurements (Rainey and Baker, 1955), but generally is smaller in size. Anderson (1972) compared cranial and external morphology of a single specimen of *N. goldmani* with specimens of *N. albigula albigula* (n = 12), *N. albigula durangae* (n = 7), *N. micropus* (n = 12), and *N. mexicana* (n = 6). The length of head and body (means in mm; *N. goldmani*, 147.0; *N. a. albigula*, 177.7; *N. a. durangae*, 181.4; *N. micropus*, 193.7; and *N. mexicana*, 176.5) and occipitonasal length of skull (means in mm; *N. goldmani*, 37.75; *N. a. albigula*, 43.32; *N. a. durangae*, 43.88; *N. micropus*, 45.80; and *N. mexicana*, 42.66) were smaller in *N. goldmani*. Additionally, Anderson (1972) determined that *N. goldmani* had relatively larger ratios of tail:head and body (*N. goldmani*, 0.871; *N. a. albigula*, 0.804; *N. a. durangae*, 0.827; *N. micropus*, 0.718; and *N. mexicana*, 0.839), hind foot:head and body (*N. goldmani*, 0.191; *N. a. albigula*, 0.185; *N. a. durangae*, 0.184; *N. micropus*, 0.181; and *N. mexicana*, 0.198), and ear:head and body (*N. goldmani*, 0.191; *N. a. albigula*, 0.155; *N. a. durangae*, 0.164; *N. micropus*, 0.133; and *N. mexicana*, 0.181).

The cranium of *N. goldmani* (Fig. 1) resembles that of a miniature specimen of *Neotoma albigula* from Coahuila. In relation to length of skull, the auditory bullae are of comparable size in *N. albigula* and *N. goldmani*, but proportionately larger in the *N. lepida* group. The posterior margin of the palatal bridge is concave in *N. albigula* and *N. goldmani* rather than truncate as in the *N. lepida* group (Rainey and Baker, 1955). *N. goldmani* differs from *N. albigula* and *N. lepida* in: "ascending branches of premaxillaries broader posteriorly; supraorbital ridges less pronounced; rostrum less massive; interparietal broader in relation to width of cranium; interorbital space, relative to length of skull, wider; and upper molar teeth broader in relation to their length" (Rainey and Baker, 1955:622). The skull of *N. goldmani* resembles those of *N. lepida* and *N. stephensi*, except *N. goldmani* is smaller with premaxillary tongues broader posteriorly, auditory bullae relatively small, and molars relatively large (Hall, 1981). The dentition of *N. goldmani* is similar to that of *N. desertorum*, but is more robust (Goldman, 1910).

GENERAL CHARACTERS. The pelage of some woodrat is long and soft with upperparts buffy grayish in young adolescents to creamy buff in adults. Flanks are ochraceous buffy in color with the head being paler. The back is darkened with black-tipped hairs while the underparts and feet are white. The tail is sharply bicolored, being blackish above and white below (Merriam, 1903). Some individuals have a small throat patch of entirely white hairs (Rainey and Baker, 1955).

Means and ranges of external and cranial measurements (in mm) of four adult females and one male *N. goldmani*, from Coahuila, respectively, are: total length, 273 (265–285), 275; length of tail, 126 (113–136), 128; length of hind foot, 29 (27–31), 28; length of ear, 27 (25–29), 28; greatest length of skull, 37.4 (36.9–38.4), 37.7; condylobasal length, 36 (35.4–37), 35.8; basilar length of skull, 31 (30.5–31.9), 30.4; zygomatic breadth, 18.7 (17.7–19.7), 18.3; length of nasals, 14.3 (13.8–14.8), 14.5; least interorbital constriction, 5.5 (5.3–5.7), 5.7; length of palatal bridge, 6.1 (5.9–6.5), 6.2; length of palatine slits, 8.9 (8.8–9.0), 8.7; and alveolar length of maxillary toothrow, 8.2 (7.9–8.3), 8.2 (Baker, 1956). Mean external and cranial measurements (in mm) of two females and two males from San Luis Potosí respectively, are: total length, 247, 271; length of tail, 120, 123; length of hind foot, 29, 30; length of ear,

FIG. 1. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Neotoma goldmani* from 3 mi. SE Torreón, Coahuila (male, Museum of Natural History, University of Kansas, 40758). Greatest length of cranium is 37.68 mm.

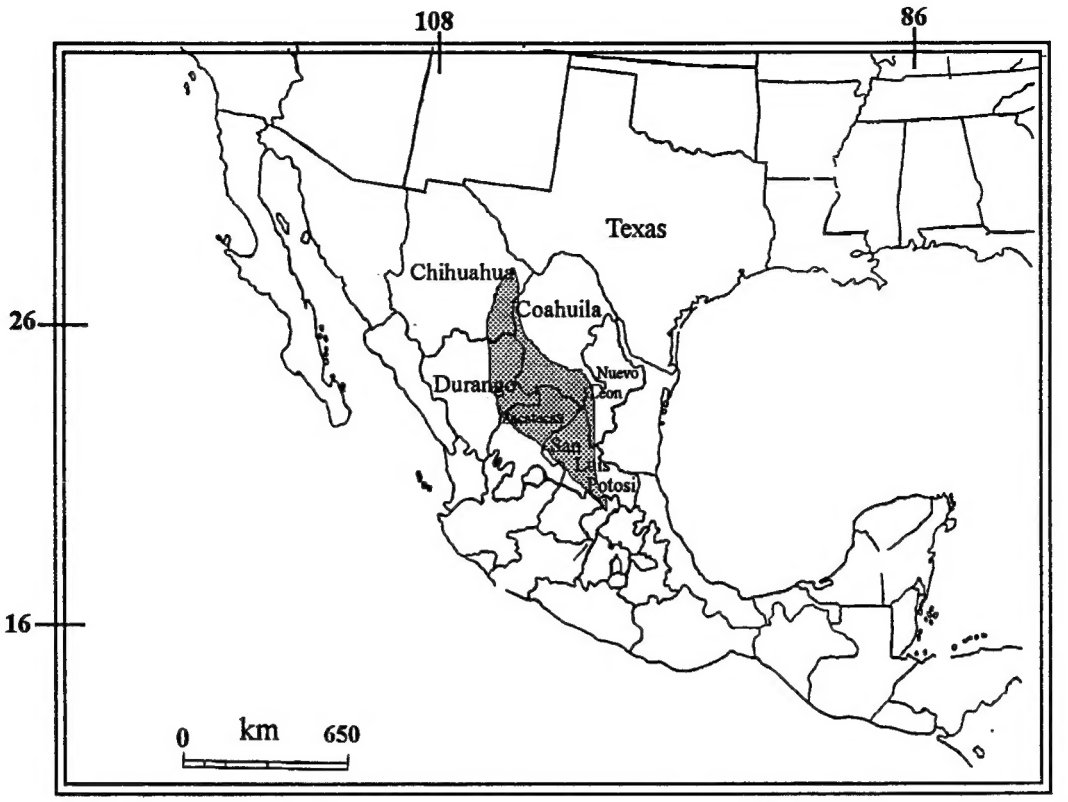

FIG. 2. Geographic distribution of *N. goldmani* from southeastern Chihuahua to northeastern Querétaro (modified from Hall, 1981 and León-Paniagua et al., 1990).

26, 25; condylobasal length, 35.5, 31.5; basilar length, 30.9, 31.6; zygomatic breadth, 19.1, 19.2; interorbital breadth, 5.6, 5.5; length of nasals, 14.6, 14.9; length of incisive foramina, 8.6, 8.7; palatal length, 6.5, 6.5; and length of maxillary tooth row, 8.0, 7.8 (Dalquest, 1953). Measurements of four adult topotypes by Goldman (1910) are within the ranges above but are not partitioned according to sex.

DISTRIBUTION. *Neotoma goldmani* occurs on the Mexican Plateau from southeastern Chihuahua to northeastern Querétaro (Hall, 1981; León-Paniagua et al., 1990; Musser and Carleton, 1993; Rainey and Baker, 1955; Fig. 2). Throughout its distribution, *N. goldmani* is restricted to rocky, desert habitats at elevations ranging from 1,160 m to 2,320 m. No fossils of Goldman's woodrat are known.

FORM AND FUNCTION. The dental formula for *N. goldmani* is i 1/1, c 0/0, p 0/0, m 3/3, total 16 (Lawlor, 1979). The baculum of *N. goldmani* most closely resembles that of the *N. albigula* group in general proportions and in having a distinct knob at the distal end (Rainey and Baker, 1955). It differs slightly from *N. albigula* in having "a less pronounced median dorsal depression at the proximal end" and "a less downwardly curved shaft" (Rainey and Baker, 1955:623). The baculum of young *N. goldmani* is like that of adults, only smaller. Measurements of a single adult male baculum (in mm) are: length, 6.2; lateral diameter of base, 2.6; dorso-ventral diameter of base, 1.4; and lateral diameter of the shaft near the middle of the bone, 0.6 (Rainey and Baker, 1955).

ECOLOGY. *Neotoma goldmani* has been reported from desert regions of the Lower Sonoran Zone in southern Coahuila (Goldman, 1910) and has been trapped in and adjacent to rocky places in this area (Baker, 1956). In the desert of southwestern Nuevo León, animals occupied rocky ledges, hidden by cacti and shrubs, along a shallow ravine (Musser, 1964). Dalquest (1953) reported finding *N. goldmani* among rocks and rocky cliffs in the isolated hills and deserts of San Luis Potosí. Nests made of sticks and grasses were noted in deep crevices in the rocks on Cerro Peñon Blanco. The sizes of these nests could not be determined because portions were hidden in the rocks (Dalquest, 1953). At Ventura, San Luis Potosí, *N. goldmani* was trapped adjacent to a stone wall beside prickly pear cacti upon which some woodrats feed. However, in the cliffs and loose stones where *N. goldmani* was most common, prickly pear was not found (Dalquest, 1953). Other vegetation types noted in areas where *N. goldmani* was trapped include: *Agave scabra, Machaonia coulteri, Yucca carnerosoma, Y. dicipiens, Dasylirion* sp., and species of *Opuntia, Larrea,* and *Acacia* (León-Paniagua et al., 1990; Rzedowski, 1981; Schmidly et al., 1985).

Neotoma goldmani has been found in sympatry with *N. albigula* in eastern Chihuahua (Anderson, 1972), near Torreón, Coahuila (Baker, 1956), in San Luis Potosí (Dalquest, 1953), in Querétaro (León-Paniagua et al., 1990), in Zacatecas (Matson and Baker, 1986), and on the Coahuila-Zacatecas border (Schmidly et al., 1985). On Cerro Peñon Blanco in San Luis Potosí, *N. goldmani* was trapped in rocks on the mountain and *N. albigula* was found in bushes and cacti at the foot of the mountain (Dalquest, 1953). However, in some situations, these two species were collected in the same traplines (Dalquest, 1953; Matson and Baker, 1986). In general, *N. albigula* is found in a variety of habitats, while *N. goldmani* is restricted to rather extreme arid regions. Other species of rodents that have been collected with *N. goldmani* include *Perognathus nelsoni* and *Peromyscus pectoralis* in southwestern Nuevo León (Musser, 1964) and *Peromyscus hooperi, P. pectoralis, P. melanophrys,* and *P. nelsoni* on the Coahuila-Zacatecas border (Schmidly et al., 1985). In Zacatecas, Goldman's woodrat populations may be depressed and locally depleted due to human influences (Matson and Baker, 1986).

In southern Coahuila, two pregnant *N. goldmani* obtained in late March each carried one embryo, sizes unknown (Baker, 1956). These females weighed 95.6 g and 96.0 g. Matson and Baker (1986) examined three pregnant females collected in Zacatecas during July and early August; two females carried one fetus each and the other carried two fetuses. Lactating females were trapped in San Luis Potosí in late July and early August and in Zacatecas during late July (Dalquest, 1953; Matson and Baker, 1986). Juveniles have been found in San Luis Potosí during the months of August, September, and October (Dalquest, 1953). The type specimen, trapped

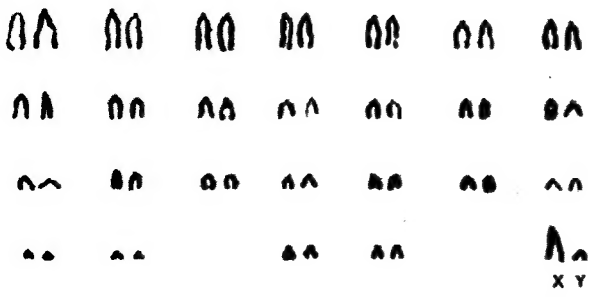

FIG. 3. Karyotype of a male *N. goldmani* from 6 mi. W Concepción del Oro, Zacatecas (reproduced from Lee and Elder, 1977).

in April 1902, was a young adolescent male from Coahuila (Merriam, 1903).

GENETICS. The karyotype of *N. goldmani* has a diploid number of 52 and a fundamental number of 54 (Lee and Elder, 1977; Fig. 3). With the exception of pairs 19 and 23, all chromosomes are acrocentric (Harris and McCullough, 1988; Lee and Elder, 1977). Harris and McCullough (1988), using G-band data, compared *N. goldmani* to *N. micropus* (proposed as primitive for the genus by Koop et al., 1985) and concluded that the two species showed extensive homology, and agreed with Lee and Elder (1977) in that *N. goldmani* has the most primitive karyotype for the genus. The G-banded karyotype of *N. goldmani* appears to possess no potential synapomorphies with other species of *Neotoma* thus far examined (Harris and McCullough, 1988).

REMARKS. Based on external appearance, Goldman (1910) placed *N. goldmani* in the *N. lepida* group, formerly known as the *N. desertorum* group. Blossom (1935) suggested that *N. goldmani* possibly was a race of *N. lepida*, but that intergradation was not yet known. On the basis of cranial and bacular morphology, Rainey and Baker (1955) placed *N. goldmani* in the *N. albigula* group. Other vernacular names for *N. goldmani* are the pygmy woodrat (occasionally spelled the pigmy woodrat) and the diminutive woodrat.

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